

## CASE STUDY

### **Technological Interactive Centre for Research on Renewable Energies and Renewable Hydrogen in Azores**

**Keywords:** environmental technologies, energy efficiency, renewal energies

**Region:** Região Autónoma dos Açores – Portugal

**Programme Type:** Innovative Actions, 2000-2006

**Duration of Project:** December 2003 – December 2005

**Funding:** Total cost: €461.810, of which €369,448 European Regional Development Fund contribution

## SYNTHESIS

**The Azores region of Portugal created a technological interactive centre for research on renewable energies with particular emphasis on renewable hydrogen. The centre is now operational and is educating students and the wider public on the potential of new energy solutions.**

The objective of the project was to create and install an interactive facility for the exhibition of renewable energy and renewable fuel technologies, with a special emphasis on renewable hydrogen. The project prepared the existing location to house and demonstrate the equipment for the exhibition. Prototypes of what can be produced for renewable hydrogen, electricity production and consumption were built. A library was also created.

The innovation in this project relates to the focus of the exhibition and the strategy for current and future work, involving partnership between the university and the municipality, and future involvement of SMEs.

The major partners in the project were the University and the Municipality of Praia da Vitória. The University coordinated, defined and decided on experiments to exhibit, while the municipality contributed through funding, political support, public visibility and with the interest of an end-user that will promote the exhibition for public and visitors awareness. This project allowed the start up of a deeper cooperation between these institutions.

By the end of the project, the exhibition area was developed and it is now open to visitors with positive reactions from those who have visited. The Region aims that its citizens gain a greater consciousness that energy alternatives to the present fossil fuel

society exist and that they can be implemented successfully in the Azores islands, both with economic and social advantages. It is expected that some visitors will be convinced to invest in renewable energy systems (e.g., wind turbines, bio-diesel, etc.). The centre will further promote innovation by stimulating students and their teachers to prepare new experiments and new solutions in this field. Some of the exhibition demonstrators are expected to be assembled by the students. In the future, new SMEs in the field of equipment commercialization should appear. The project will also offer a consultancy service where anyone can come and ask advice about renewable energy solutions for their own private appliances.

The EU impulse was crucial to the development of the project. Without its support it would have been impossible to implement it. Now the project is able to continue and generate its own funds.

## I. PROJECT DESCRIPTION

### **Project objectives**

The main purpose of this project was to create and install an interactive facility for the exhibition of both renewable energy and renewable fuel technologies, with special emphasis on renewable hydrogen. This was designed to work as an open space where the wider public and school students in particular would be able to interact with several experiments and equipment operating both with renewable energies and renewable fuels (renewable hydrogen, bio-diesel, bio-ethanol and bio-fuels in general).

The main objectives were:

- To persuade the wider public that current energy solutions must change in order to build a sustainable future and better environment for the forthcoming generations.
- To demystify new energy solutions so that the population can understand their feasibility and start to implement them.
- To bring the new generations into direct interaction with new energy solutions in order to trigger future vocations in this field.
- To start a systematic marketing of new energy solutions in order to stimulate the wider public to adopt them in their daily lives.

### **Description/type of activity**

The project involved the adaptation of an existing municipal covered space for the installation of the interactive exhibition, including purchase and installation of all the necessary equipment. It included the design and preparation of materials and seminars to be presented to the public.

In particular, the project managed to:

- prepare the existing infrastructure to receive the equipment for the exhibition on renewable energies and renewable fuels (mainly hydrogen) under strict safety conditions and in a friendly environment,
- acquire the equipment and build prototypes of what can be produced in the future on real sized scale for renewable hydrogen, electricity production and consumption,
- Install and test all demonstration devices for the exhibition space,
- create a student targeted library on energy, technology and environmental themes, and
- demonstrate real sized applications and devices in the space outside the exhibition, so that examples of renewable energy and fuel solutions can be understood and people can start to use them on a daily basis.

### **Beneficiaries**

The project was primarily targeted at students from all class levels. Teachers and their students from different schools will be invited to get involved in “afternoons” devoted to experimentation and seminars on renewable energies and sustainable development.

The plan also includes several actions especially devoted to general citizens of all ages and SMEs. In this case, a more solution oriented approach will be used, in order to attract them to implement new energy solutions and good practices of consumption.

## **II. POLITICAL AND STRATEGIC CONTEXT**

### **Strategic context**

Modern civilisation is strongly dependent on energy. Fossil fuels are at the base of present energy systems. More than 80% of worldwide consumption depends on fossil fuels, while the remaining is almost equally shared by nuclear, hydroelectric and biomass. Although modern civilisation was built with the precious support of fossil fuels, it is forecast that they will be exhausted in just a few decades while they also are the source of major climate and global change by way of pollution, greenhouse effects and international conflicts. It is clear that modern civilisation needs urgently to find a sustainable energy solution. The inevitable answer is that it can only be achieved through the clean renewable energy and renewable fuels solution.

Technology Innovation and Education are immediately at the forefront of that change. Adapted old solutions together with new solutions and new competences are required

to endeavour such energy system change. The PTEC-H2RE project is in line with these concerns and is intended to develop ways to educate, marketing and make public aware of the new solutions for energy sustainability.

The project is part of a wider economic development strategy where, through dissemination of information and awareness-raising on new energy solutions, the Azores Region may expect better practices of consumption and the adoption by citizens of new energy solutions in order to reduce imports of fossil fuels and thus be less dependent on external energy resources, which one of the most urgent priorities of this outermost Region.

A number of these proposed solutions may be adopted by SMEs and tourist facilities. This project aims also to promote specialised training and research at the Azores University, with a clear outcome at the level of new technicians prepared to help implementing endogenous energy solutions.

### **Innovation**

Innovation in this project is mainly brought by the fact that a similar exhibition devoted to the promotion and awareness-raising on renewable hydrogen and renewable energies is not known in Portugal. It is also the first time that the University of Azores receives financial support from a municipality (Municipality of Praia da Vitória), being both partners in the Project.

The strategy envisaged for future work is also innovative, since it is planned to rent the facilities of the Centre for particular periods of time to SME initiatives, on condition that these initiatives are related to new energies and sustainable development. This will help to support the financial costs maintaining the exhibition.

### **Political support**

Regional and local authorities, namely the Municipality of Praia da Vitória supported the building costs where the exhibition is installed, donating the premises and co-financing their adaptation for the exhibition.

In several occasions and public events the Mayor of Praia da Vitória has mentioned the importance of this exhibition to promote knowledge and visitors activities inside the Municipality.

Cooperation between the University (LAMTEC) and the Municipality is seen by the University as a pioneer operation and the beginning of a multi-polar era of the University, whereby it begins to work in locations outside the main campus.

### III. IMPLEMENTATION

#### **Programming**

With an outermost region status, the distance of Azores to the European mainland implies extra-costs to the daily life in this Region. It is also impossible for the Azores islands to be connected to the European electricity network. This makes the Azores Region very vulnerable and dependent on fossil fuel costs. The need for alternative, endogenous energy sources is therefore clear and urgent alternative solutions are required.

This project is a significant contribution both for public in general and citizens' awareness of new renewable energy solutions and sustainability, as well as for children and student education in these areas.

This sector was identified as a priority by the Regional Directorate for Studies and Planning (DREPA) which organised an open call for proposals. The project was selected among several others that were submitted for funding.

The project will be financially sustainable after its installation phase (funded by this project), using space rental and publicity inside the exhibition area. It is expected that it will be able to attract public and private funds, mainly from SMEs oriented to innovation, new technologies and alternative energy solutions.

#### **Management structure quality and effectiveness**

The project management team had regular meetings with the whole staff involved in the design and development of the project in order to evaluate progress, identify difficulties and devise ways to proceed.

Difficulties were encountered sometimes in finding the equipment with the exact technical specification for the exhibition. Since renewable hydrogen is a very new approach for energy solutions worldwide, it was sometimes too hard to find the appropriate equipment at an affordable cost.

The frequent contact with students, because this is a University Laboratory and because the staff contracted to work on the project are also school teachers and professors, facilitated the interaction directly with students and identification of their precise expectations. Putting together these different professional experiences allowed the region to build an exhibition that would correspond to student expectations.

#### **Partnership**

Major partners in the project are the University (through LAMTEC) and the Municipality of Praia da Vitória. The University had the role to coordinate, to define and to decide about experiments to exhibit. The Municipality of Praia da Vitória

contributed through funding, political support, public visibility and with the interest of an end-user that will promote the exhibition for public and visitors awareness.

The University and the Municipality had a previous experience on cooperation, but it was only at the level of recognising the importance to bring the University to the Municipality. This project allowed the start up of a deeper cooperation between the institutions.

### **Marketing**

Several public conferences were conducted during the life time of the project installation, both in the Azores Region and other regions of Portugal.

Another major instrument of marketing was through local and regional press and television.

Several leaflets were designed and will be reproduced to go together with the exhibition experiments.

### **Obstacles in terms of design or implementation**

The greatest difficulty was at the level of finding equipment with the exact specification required at each tendering process. Sometimes the project was forced to choose alternative or equivalent solutions, either because there was no answer to match exactly the technical specifications or because the cheapest proposals were still too expensive.

### **Transferability**

The project was developed in Terceira Island, but it could be easily replicated, at least part of it, in another island or Region. Of course the project benefits from the presence of a University team specialised in the Physics, Environment and Energy fields, which is a major support for the success of the project and a substantial knowledge capital.

The major challenge for transferability is the need for a permanent staff in the field of expertise (from University in the present case) and the cost of the equipment required, because it is a very new area of energy and so still very expensive.

## IV. EFFECTIVENESS

### **Effectiveness**

The major expected result from the project was the installation of the renewable hydrogen and energy exhibition space. This result was fully achieved.

The expected results were the following:

- Physical installation of the exhibition area (equipment, documentation and multimedia elements) at the LAMTEC building.
- Implementation of three guided visit programmes specially targeted at students aged between 5 and 18 years old, university level students and the general adult public.
  
- It was expected that this exhibition space and related documentation, together with the prepared promotional actions, would work as a vehicle of awareness- raising on the new sustainable energy solutions.

Against these expected results, the following tangible results have already been obtained:

- Physical installation of the exhibition area (equipments, documentation and multimedia elements) is achieved.
- The exhibition space is already partially open to visitors (mainly from local secondary schools) since the inauguration date on 17 of February 2006.
- The Centre is getting very enthusiastic reactions from those visitors who already visited it.

It is expected that the exhibition will be fully opened to the public in general in October 2006.

Of course, this is a project to be continued after the funding period and the future will become the real test for the success of the project. It is expected that students and citizens will become more aware of new energy solutions and more conscientious about how to better use energy and alternatives.

### **Potential impact**

The Region aims that its citizens gain a greater consciousness that energy alternatives to the present fossil fuel society exist and that they can be implemented successfully in the Azores islands, both with economic and social advantages. For example, the initiatives with students are expected to attract at least some of them to this new field of knowledge. The initiatives close to the public are expected to bring some of them to buy renewable energy systems (e.g., wind turbines, bio-diesel, etc).

It will further promote innovation by stimulating students and their teachers to prepare new experiments and new solutions in this field. Some of the exhibition demonstrators are expected to be assembled by the students.

New SMEs in the field of equipment commercialization will certainly appear in the forthcoming years.

The project will also offer to the citizens a consultancy service where anyone can come and ask advice for renewable energy solutions for their own private appliances.

### **Sustainability**

The project will continue after the funding from the European Regional Development Fund. Two major sources for funding will be: **i)** the University - LAMTec budget for management and staff contracts and **ii)** the rental services that will be implemented within the exhibition space.

Current costs with staff and maintenance will be supported by LAMTec budget. Publicity services will be commercialised for SMEs and the space will be rented for particular SME initiatives under the condition that these shall be always in the field of alternative energies and sustainable development. There are already two SMEs in the field that are interested in using the exhibition space periodically to promote their products. The energy used in the Centre has renewable origins both through wind electricity and wind hydrogen and bio-diesel installed in the LAMTec.

Given that LAMTec is a non-profit making institution all generated financial resources will be employed in maintaining the expo space.

## **V. CONCLUSIONS**

### **Lessons learnt**

The main positive lesson from this project is that it is important for success to have a specialised team designing and conceiving the demonstrators in order to show the viability of alternative energies. It is also important to involve since the very start school teachers with the purpose to merge experiments with school programmes.

Another important matter in this field is that safety concerns need to be fully taken into account. The exhibition space was designed and is equipped within the strict respect of safety rules, in order to prevent accidents for the staff and for the public in general.

If a similar project is implemented somewhere else it is important that the funding approach is flexible. It is important for the success of such initiative that the funding flow be available in a proper and timely manner, particularly if the promoter is a University institution or non-profit making.



## Good practices

Important keys of success were:

- A good plan for the demonstrators build up, both economically as well as technically.
- A good cash flow delivered in due time.
- The constitution of a specialised team that included both University researchers and school teachers.
- A plan and its implementation for financial sustainability of the project after PRAI funding.

All these keys together worked towards a final success.

## Community added value

The EU impulse was crucial to the development of the project. Without its support it would have been impossible to implement it. The possible financial support from the Municipality covered 20% of the whole budget, so the remaining 80% was too much for the University to support.

Now the project is able to continue and generate its own funds because there is a public space and equipment with adequate visibility and public usefulness.

The concept proved to be a very good experience for outermost regions like Azores, where it is not easy to put together several European partners to promote local and regional interests, but where Europe must be also present.

Innovation in ultra-periphery regions is probably a wider concept than it is in the mainstream programmes for the whole continental Europe, so having such a program in Azores was a unique opportunity for local and regional citizens.

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